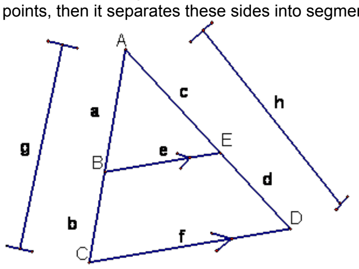
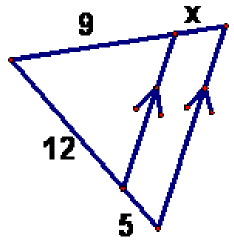
6.4 Parallel lines and proportional parts

Theorem 6.4-Triangle Proportionality Theorem-If a line is parallel to one side of a triangle and intersects the other two sides in two distinct points, then it separates these sides into segments of proportional lengths.

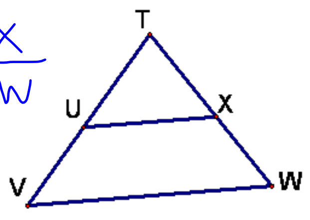




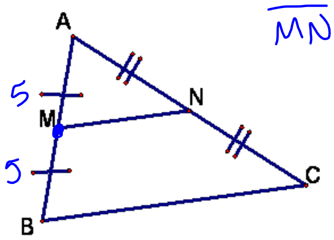
Theorem 6.5-Converse of the triangle proportionality Theorem-
If a line intersects two sides of a triangle and separates these sides into segments of proportional length then the line is parallel to the third side.

If $\frac{TU}{UV} = \frac{TX}{XW}$

then $\overline{UX} \parallel \overline{VW}$

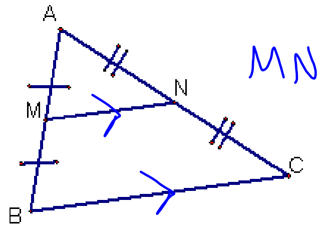


Midsegment-of a triangle is a segment whose endpoints are the midpoints of two sides of a triangle.



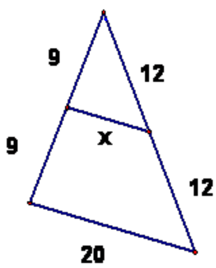
$\overline{MN}$ is the midsegment

Theorem 6.6-Triangle Midsegment theorem-A midsegment of a triangle is parallel to one side of the triangle, and its length is ½ the length of that side.



$MN = \frac{1}{2} BC$

$\overline{MN} \parallel \overline{BC}$



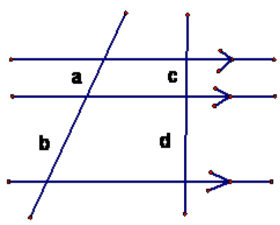
$x = \frac{1}{2} 20$

$x = 10$

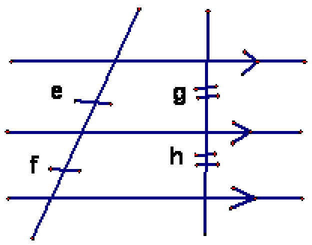
$\frac{9}{18} = \frac{x}{20}$

Corollary 6.1-If three or more parallel lines intersect two transversals, then they cut the transversals proportionally

Corollary 6.2-If three or more parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

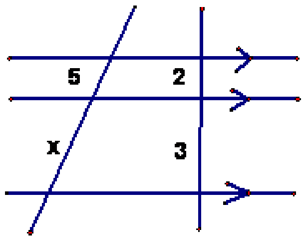


$\frac{a}{b} = \frac{c}{d}$



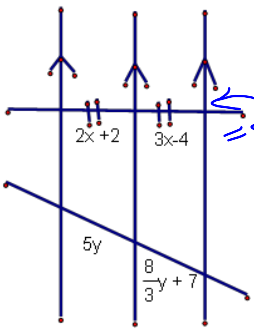
$e = f$ $\quad g = h$

$\frac{e}{f} = \frac{g}{h}$



$\frac{5}{x} = \frac{2}{3}$

$2x = 15 \quad x = 7.5$



$\frac{2x+2}{3x-4} = \frac{5y}{\frac{8}{3}y+7}$

= segments

$2x+2 = 3x-4$

$6 = x$

$\frac{15}{3}y = \frac{8}{3}y + 7$

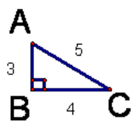
$\frac{7}{3}y = 7 \cdot \frac{3}{7}$

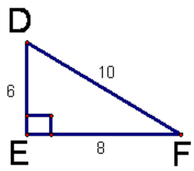
$\boxed{y = 3}$

6.5

Parts of Similar Triangles
Ex:

Scale factor 1:2
ΔABC P= 12u
ΔDEF P= 24u
Ratio of perimeters
12:24
1:2

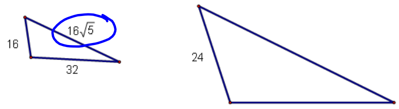




Theorem 6.7-Proportional Perimeters Theorem-If two triangles are similar, then the perimeters are proportional to the measures of the corresponding sides.

The $\triangle$s are $\sim$.

Find the perimeter of the larger $\triangle$



① Scale Factor

$$\frac{16}{24} = \frac{2}{3}$$

② Find the per. of Known shape

$P = 16 + 32 + 16\sqrt{5}$

$P = 48 + 16\sqrt{5}$

③ Set up a proportion

$$\frac{2}{3} = \frac{48+16\sqrt{5}}{P}$$

$2p = 3(48+16\sqrt{5})$

$2p = 144 + 48\sqrt{5}$

$p = 72 + 24\sqrt{5}$ u

Special segments of similar triangles

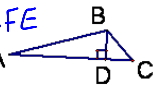
Theorem 6.8-If two triangles are similar, then the measures of the corresponding **altitudes** are proportional to the measures of the corresponding sides.

Theorem 6.9-If two triangles are similar, then the measures of the corresponding **angle bisectors** are proportional to the measures of the corresponding sides.

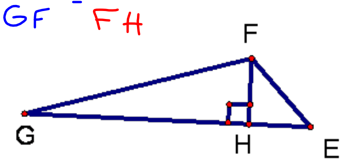
Theorem 6.10-If two triangles are similar, then the measures of the corresponding **medians** are proportional to the measures of the corresponding sides.

Thm. 6.8

$\triangle ABC \sim \triangle GFE$



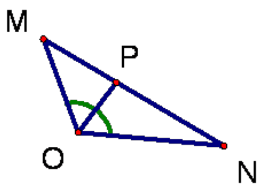
$$\frac{AB}{GF} = \frac{BD}{FH}$$

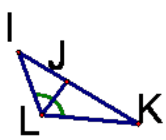


Thm. 6.9

$\triangle MON \sim \triangle ILK$

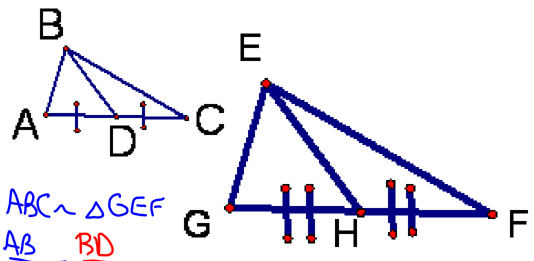
$$\frac{MO}{IL} = \frac{OP}{LJ}$$





median – segment in a Δ from a vertex to the midpt of opposite side

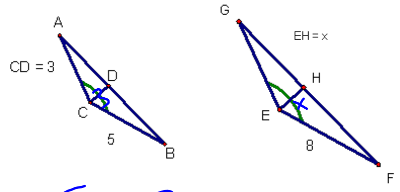
Thm 6.10



ΔABC ~ ΔGEF

$\frac{AB}{GE} = \frac{BD}{EH}$

ΔABC ~ ΔGFE What is EH?



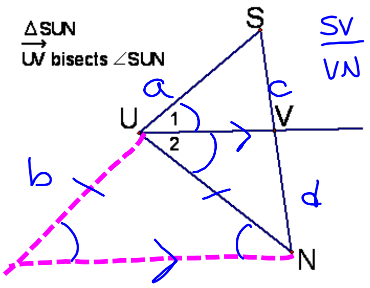
$\frac{5}{8} = \frac{3}{x}$

$x = 4.8$

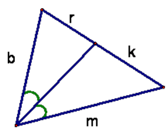
Theorem 6.11-Angle Bisector Proportion Theorem-an angle bisector in a triangle separates the opposite side into segments that have the same ratio as the other two sides.

ΔSUN

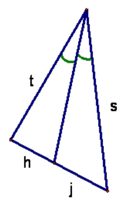
$\overrightarrow{UV}$ bisects ∠SUN



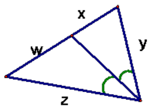
$\frac{SV}{VN} = \frac{SU}{UN}$



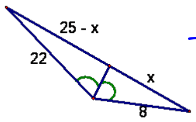
$\frac{b}{m} = \frac{r}{k}$



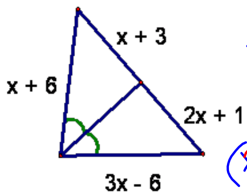
$\frac{h}{j} = \frac{t}{s}$



$$\frac{z}{y} = \frac{w}{x}$$



$$\frac{22}{8} = \frac{25-x}{x}$$



$$\frac{x+6}{3x-6} = \frac{x+3}{2x+1}$$

$$(x+6)(2x+1) = (3x-6)(x+3)$$

$$2x^2 + x + 12x + 6 = 3x^2 + 9x - 6x - 18$$

$$2x^2 + 13x + 6 = 3x^2 + 3x - 18$$

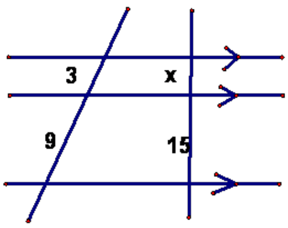
$$0 = x^2 - 10x - 24$$

-24
-12 2
-10

$$0 = (x-12)(x+2)$$

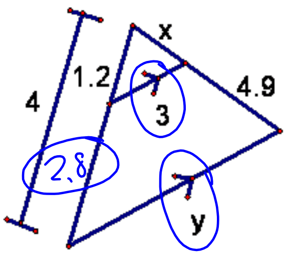
$x - 12 = 0$ $x + 2 = 0$

$x = 12$ $\cancel{x = -2}$



$$\frac{3}{9} = \frac{x}{15}$$

$x = 5$



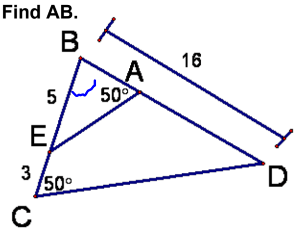
$$\frac{x}{4.9} = \frac{1.2}{2.8}$$

$x = 2.1$

$$\frac{3}{y} = \frac{1.2}{4}$$ *

$y = 10$

Find AB.



$\triangle ABE \sim \triangle CBD$

HW
p312-313 #s 14-18, 20, 21, 33, 34

p320-321 #s 10, 11, 14, 22-24